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P1625 US
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Has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.

Therefore, this

United States Patent

Grants to the person(s) having title to this patent the right to exclude others from making, using, offering for sale, or selling the invention throughout the United States of America or importing the invention into the United States of America for the term set forth below, subject to the payment of maintenance fees as provided by law.

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If this application was filed on or after June 8, 1995, the term of this patent is twenty years from the U.S. filing date, subject to any statutory extension. If the application contains a specific reference to an earlier filed application or applications under 35 U.S.C. 120, 121 or 365(c), the term of the patent is twenty years from the date on which the earliest application was filed, subject to any statutory extension.

Bruce Lehman

Commissioner of Patents and Trademarks

Marjorie V. Turner

Attest

US005651599A

United States Patent [19]

Fujimori et al.

[11] Patent Number: 5,651,599

[45] Date of Patent: Jul. 29, 1997

[54] **PROJECTION TYPE LIQUID CRYSTAL PROJECTOR**

[75] Inventors: **Motoyuki Fujimori; Toshiaki Hashizume; Kenji Iguchi; Keisuke Sakagami; Kiichi Okumura**, all of Suwa, Japan

[73] Assignee: **Seiko Epson Corporation**, Tokyo-To, Japan

[21] Appl. No.: **394,308**

[22] Filed: **Feb. 24, 1995**

Related U.S. Application Data

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[51] **Int. Cl.**[6] **G03B 21/14**

[52] **U.S. Cl.** **353/61**; 353/58; 353/119

[58] **Field of Search** 353/31–37, 52, 353/55, 57–58, 60–61, 119, 122; 359/83; 362/264, 345

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Primary Examiner—William Dowling
Attorney, Agent, or Firm—Ladas & Parry

[57] **ABSTRACT**

A projector for separating white light into three primary colors, forming images with liquid crystal light valves, mixing these images, and projecting an enlarged picture of the mixed images with a projection lens. The projector includes an optical unit having a light source, a plurality of dichroic mirrors for separating the white light into blue, green, and red beams, respective liquid crystal light valves forming images of the blue, green, and red colors. The optical unit has a chassis with a rigid center portion at which one of the liquid crystal light valves is mounted, the other two light valves being mounted symmetrically with respect thereto. An adjustment mechanism is provided for matching pixels of the second and third color valves with those of the first color valve. The red color liquid crystal light valve is disposed midway between the blue and green color liquid crystal light valves and a cooling fan is disposed below the red color liquid crystal light valve.

4 Claims, 54 Drawing Sheets